V_{cb} represent the maximum positive voltage across R? If the answer to this question is 'yes', does this imply that the maximum voltage across L occurs at the same time as that across R? If not, what does V_{cb} represent?—Yours faithfully,

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15th March 1964

A new deal for vector diagrams

Dear Sir—Mr. Scroggie in his article in the February 1964 issue of *Electronics and Power*, p. 47, states that 'there must be satisfactory conventions to relate the vector diagram to the circuit diagram', from which one may deduce that 'vector diagrams are supposed to show the electrical conditions in a.c. circuits'. This I feel is a misinterpretation of the basic purpose of a vector diagram.

The electrical engineer is introduced initially to the concept of an alternating quantity by means of sinusoidal curves and trigonometric expressions of the type $X = X_m \sin(\omega t + \phi)$. It is the difficulty experienced in the addition, subtraction and multiplication of this kind of expression that has produced a graphical method of achieving the same results—the vector diagram. Thus the basic purpose of a vector diagram is to provide a graphical representation of a sinusoid that will be easier to manipulate and will yield a more ready interpretation than the corresponding trigonometric expressions. In order to achieve this end, the convention established must be mathematically rigid, in the sense that it is exact, sufficient and complete, without omission or excess of significance.

Such a definition has, I submit, been given in my article in the June 1959 issue of the *Bulletin of Electrical Engineering Education*, p. 55.

In relation to Mr. Scroggie's article, I would take issue on a few specific points:

- Why is he so much concerned with ascribing a specific polarity to a voltage which he knows to be alternating? Here surely is an excess of significance that leads to confusion. The information sought is already included, without the use of lettering, in vector diagrams following the convention described in the article already alluded to.
- How is the length of his vector determined, and why are some vectors drawn at right-angles to others?
- Do not the vector diagrams of Fig. 2 merely illustrate that vectors are associative and commutative? They are only likely to lead to confusion if improperly explained; they do not appear to be basically inconsistent among themselves.
- If, in Fig. 4, V_{dc} represents a maximum positive voltage across the inductor L, does